NORTHERN HARRIER (*Circus cyaneus*)

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Criteria Scores

Population Trend	Range Trend	Population Size	Range Size	Endemism	Population Concentration	Threats
15	10	7.5	5	0	0	15

Special Concern Priority

Currently considered a Bird Species of Special Concern (year-round), Priority 2. Included on the original prioritized list (Remsen 1978) as well as CDFG's (1992) unprioritized list.

Breeding Bird Survey Statistics for California

Data inadequate for trend assessment (Sauer et al. 2000).

General Range and Abundance

Comprised of two subspecies, *C. c. cyaneus* in the Old World and *C. c. hudsonius* in the New World. In North America, breeds from mid- to lower-latitudes of the United States to northern Alaska and Canada. Absent or rare breeder in many states and in mountainous or desert regions of west coast (Small 1994). Northern populations are migratory and winter from southern Canada to Central America. Resident populations are located throughout northern and middle United States.

Seasonal Status in California

Occurs year-round throughout the state, with population consisting of resident breeders, nomadic individuals, and migrants. Breeding season extends from mid March through August.

Historical Range and Abundance in California

Grinnell (1915) described the northern harrier as a "common" winter visitant to valleys and marshlands throughout the state, remaining through the summer locally in the Modoc region and

at various point west of the desert divide, east and south of the humid coast belt. Recorded many instances as nesting in the San Joaquin Valley, and south through San Diego County. Dawson (1923) described the harrier as a "fairly common" winter visitor, breeding "commonly" east of the Sierras south at least to Owens Valley; and "sparingly" west of the Sierras at various valley points outside of the fog belt, and south to San Diego.

Grinnell and Miller (1944) described the harrier as occurring "widely" as a winter visitant, and "common" locally in migration, with relatively small numbers occurring through summer to breed. In winter and during migration, they occur the entire length and breadth of the state from below sea level to 9800 ft (2970 m), in a variety of open habitats. Historic breeding documented within coastal counties including: Point Reyes, Marin County; Pescadero, San Mateo County; Dunes Lakes, San Luis Obispo County; Saticoy, Ventura County; Alamitos, Los Angeles County; Seal Beach, Orange County; Torrey Pines, San Diego County. Definite breeding also documented near Mount Shasta City, Siskiyou County; east of the Sierras near June Lake, Mono County; Buena Vista Lake, Kern County; and in southeastern counties near Chino, San Bernardino County, and Corona, Riverside County. No breeding records were presented for the extreme northern coastal counties (Mendocino, Humboldt, Del Norte), nor were any quantitative estimates of historic abundance presented.

In southern California, Garrett and Dunn (1981) site nest locations at the mouth of the Tijuana River, and the vicinity of Camp Pendleton, San Diego County; near Lakeview, Riverside County; at Harper Dry Lake, San Bernardino County; in Owens Valley, Inyo County; at Morro Bay, San Luis Obispo County; and probably in the Antelope Valley, Los Angeles County and on Vandenberg AFB, Santa Barbara County.

Recent Range and Abundance in California

Although the general outline of the breeding range has changed little, local breeding numbers within the overall range have been greatly reduced, if not extirpated completely. While local declines in breeding numbers have been observed in southern and coastal CA, declines in other areas of the state can only be inferred by the decline in suitable breeding habitat, mainly undisturbed grasslands and wetlands. Winter distribution can be determined largely by habitat type. Harriers are extremely nomadic, making it difficult to estimate abundance. For example, a breeding adult male that was banded in San Diego County in May of 1991 was recovered in June of the same year near Klamath Falls, Oregon (Pavelka 1992); and a nesting adult female that was banded on Camp Pendleton, San Diego County in May of 1982 was recovered in August of 1989 near Battle Mountain, Nevada (Bloom, unpubl. data). The highest densities of breeding harriers are currently found in the Klamath Basin, the northern Central Valley, and the Great Basin (northeastern CA). Loughman and McLandress (unpubl. data) reported the following numbers of nests located on state and federal refuges: a total of 45 nests from 1987-1989 in northeastern CA; 24 nests from 1987-1988 in the Sacramento Valley; 45 nests from 1987-1991 in the San Joaquin Valley; and 150 nests from 1987-1992 in the Suisun Marsh, Solano County.

Northeastern California. Lassen County contains approximately 15 breeding pairs and Modoc County holds about 25 pairs that nest in wet pastures, refuges, and in stringer meadows on Bureau of Land Management and Forest Service lands amongst big sagebrush (*Artemesia tridentata*) in the Great Basin Desert (Bloom pers. comm.). As most of these territories involve intense grazing on both private and public lands, many nesting attempts fail as a result of crushed eggs. Most of the state and federal refuges are managed for waterfowl and as a result, nesting attempts on refuges often succumb to flooding intended for waterfowl production (Bloom pers.

comm.). The Klamath Basin of California, located mostly in Siskiyou County, has a robust yet unmeasured nesting harrier population.

Coastal California. Garrett and Dunn (1981) state that previous nesting areas along the southern coast had been deserted by the 1970s, with current nesting only in coastal San Luis Obispo and San Diego counties. Harriers formerly bred in Dune Lakes, San Luis Obispo County; Saticoy, Ventura County; Alamitos, Los Angeles County; Seal Beach, Orange County; and near Del Mar, San Diego County.

Central Valley (Sacramento and San Joaquin Valleys). Currently, most breeding harriers occur within State and Federal Refuges, where the protection and management of wet grasslands for waterfowl attract relatively high numbers of harriers. Christmas Bird counts show a high concentration in the grasslands of the San Joaquin Valley (Root 1988). A reduction in population size in the San Joaquin Valley may be inferred by the loss of suitable habitat due to the conversion of grasslands to unfavorable agriculture. Between 1970 and 1994 a significant increase in orchards and vineyards, and a significant decrease in alfalfa and irrigated pastures was observed (Schweizer and Chesmore 1996). Harriers prefer to hunt in alfalfa fields and irrigated pastures (cite), likely due to the greater abundance and vulnerability of prey in comparison to orchards and vineyards. Except for refuges, most of the area within the Central Valley not suitable breeding habitat.

Southern California. Bloom (pers. comm.) estimates 25 pairs or less in cismontane California from southern Ventura County to the Mexican border. There are currently no known nesting pairs in coastal Los Angeles County and only very limited potential in the Antelope Valley. Known breeding pairs in Orange County have declined over the last 35 years from approximately 10 to an average of less than one successful nest per year due to conversion of

coastal grasslands to urban development, and to the disturbance and predation connected with such human invasion (Bloom pers. comm.). Previous nests recorded in salt marshes (Sexton and Hunt 1979) and San Joaquin Hills (Hamilton and Willick 1996) no longer exist. In San Diego County, Unitt (1984) notes seven former definite breeding locations (pre-1980), and only two recent definite breeding locations. The majority of recent nesting locations in San Diego County occur on Camp Pendleton Marine Corp Base (up to 9 nesting pairs) and Tijuana Slough (6 pairs) (Bloom pers. comm.). Agricultural practices in the desert have allowed harriers to occupy drier areas such as Owens Valley, Inyo County, and Imperial Valley, Imperial County, but numbers of breeding pairs are low.

Ecological Requirements

The opportunistic food habits of harriers allow them to exploit a variety of different open habitat types in winter and during migration. In the non-breeding season, they occur widespread throughout the state in sagebrush scrub, upland and lowland grasslands, meadows, fresh and brackish wetlands, estuaries, pastures, and agricultural lands. Breeding harriers may be associated with similar habitats types, yet they require large tracts of undisturbed habitat and an abundance of vulnerable prey for successful nesting.

Harriers nest on the ground, preferring idle undisturbed wetlands or grasslands dominated by thick vegetation, though choice of vegetation type varies widely (Hamerstrom and Kopeny 1981, Apfelbaum and Seelbach 1983). Wet grasslands and marshes appear to support the highest densities of breeding harriers (MacWhirter and Bildstein 1996). In California, nests have been located on state and federal refuges in upland fields managed for waterfowl (Loughman and McLandress, unpubl. data). While croplands, in general, contribute little suitable habitat for breeding harriers, they have occasionally been observed nesting and/or foraging in cultivated

fields of sugar beets (Wilkinson and Debban 1980) and alfalfa (Martin 1987), although nests within these fields are subject to destruction by plowing. Overgrazed habitats provide little if any useful habitat for harriers (Martin 1987, MacWhirter and Bildstein 1996). Average home range of harriers outside of CA varies from 1.13 km^2 - 124.9 km^2 (Martin 1987). Harriers typically raise a single brood of 4-5, but may lay replacement clutches if first clutch is lost to predation or disturbance (Simmons 1984). One banded pair at an estuary in San Diego County produced 3 clutches of 6 eggs before being shot as part of a predator management program (Bloom pers. comm.).

Harrier population densities, and territory size, vary in response to local changes in prey availability and habitat (Grant et al. 1991, Martin 1987). In many areas, voles (*microtus spp*.) are the most commonly taken prey item, with juvenile birds becoming important in the diet later in the season (Barnard et al 1987, Bildstein 1988). California voles tend to thrive under moist conditions, such as wet grasslands and irrigated agricultural conditions (Krebs 1966). Lack of water reduces vole reproduction (Church 1966), and reduction or loss of vegetation may also reduce vole populations (Birney et al. 1976). Undisturbed wetlands provide a plethora of rodents and passerines for harriers to prey on throughout the breeding season. In short, habitats that provide an abundance of vulnerable prey, in addition to undisturbed nesting sites, are likely to support breeding harriers.

Threats

The primary threats to breeding populations of harriers are loss of suitable nesting and foraging habitat, and nest failure due to human disturbance, predation, and agricultural practices. The single most important threat to nesting harriers in southern coastal California is predator management aimed at protecting endangered California least terns (*Sterna antillarum*), which

annually results in the loss of adults and productivity (Bloom pers. comm.). Breeding harriers are limited by large tracts of suitable undisturbed nesting habitats. Suitable habitat, especially coastal grassland and wetlands, is being lost to urban development and to conversion of grasslands to agriculture. In addition, overgrazing and haying can degrade suitable harrier habitat by can by reducing small mammal population on which the harrier depends (Cornely et al. 1983).

Harriers are ground nesters, making them highly vulnerable to predation, trampling (livestock, ungulates, humans), flooding, mowing, plowing, and fire. As human encroachment continues, urban predators such as raccoons (*Procyon lotor*), and opossums (*Didelphis marsupialis*), as well as feral domestic cats and dogs, place increasing pressures on harriers attempting to nest in lands adjacent to urban areas. While state and federal refuges do provide a significant amount of suitable nesting habitat within CA, nest success may be low due to predation, disturbance, and flooding practices. Lastly, there have been numerous nest failures and adult mortality directly caused by Animal Services in attempts to protect certain endangered species (Bloom pers. comm.). These incidences occur in areas where harrier populations are already extremely taxed.

Management and Research Recommendations

- minimize human disturbance near nesting areas. This may require restricted public access during the breeding season.
- reduce livestock impacts on nesting success by limiting access to nesting areas.
- maintain a mosaic of large undisturbed habitats for nesting and foraging.
- maintain habitats that promote abundant prey base. For example, abandoned fields, active alfalfa fields, wet grasslands, fields with dense vegetation cover and residual vegetation.

- practice rotational system of grassland management, leaving some sections idle in each year.
- delay haying and plowing until after nestlings have fledged (~ mid July).
- modify waterfowl management practices on refuges. While numbers have not been documented, there is concern that a significant number of harrier nests, as well as short-eared owl nests, are lost as a result of flooding practices.
- monitor reproductive success in high density nesting areas (e.g., state and federal refuges).
- conduct long-term studies on survival, reproduction, and dispersal of harriers in CA.
- study the effects of patch size and fragmentation on habitat use and nest success.
- investigate the effects of environmental contaminants on harriers and on prey populations.

Monitoring Needs

Need reliable long-term statewide monitoring of populations in CA. The Breeding Bird Surveys and Christmas Birds Counts are not adequate for monitoring population trends of harriers due to low relative abundance detected per site and to the nomadic behavior exhibited in harriers. Harriers could be monitored in conjunction with other grassland bird species, following recommendations presented in the Draft Grassland Bird Conservation Plan (CPIF 2000). Harriers, along with other raptor species, may be detected using road and/or foot surveys in appropriate open habitats. Sites should be visited and thoroughly scanned at least once a month from Feb-Aug to determine site occupancy. Breeding may be determined by focusing on behaviors such as courtship and carrying of nesting material and/or prey. Tracking birds before sunset and after sunrise may help to locate communal roosts.

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